



Department of Energy
Washington, DC 20585
December 23, 1998

RCRA Information Center (RIC)
Office of Solid Waste (5305G),
U.S. Environmental Protection Agency
401 M Street, SW
Washington, DC 20460

SUBJECT: *Human Health Risk Assessment Protocol for Hazardous Waste Combustion
Facilities* (Public Review Draft);
Docket number F-98-HHRA-FFFFF

The U.S. Department of Energy (DOE) welcomes the opportunity to provide comments on the subject guidance, which was announced in the October 30, 1998 Federal Register (63 FR 58381). Accordingly, enclosed for your consideration are the Department's comments and recommendations regarding the public review draft. These comments are the consolidated comments of subject matter experts of the DOE Mixed Waste Focus Area, National Technical Working Group.

Questions on these comments should be directed to John Bascietto of my staff at 202-586-7917; e-mail: john.bascietto@eh.doe.gov).

Sincerely,

Thomas T. Traceski
Director, RCRA/CERCLA Division
Office of Environmental Policy and Assistance

Enclosure

U.S. Department of Energy (DOE)
Comments on *Human Health Risk Assessment Protocol for Hazardous Waste Combustion*
***Facilities*; RCRA Docket No. F-98-HHRA-FFFFF**
(Environmental Protection Agency [EPA] Public Review Draft, October, 1998)

The EPA Draft *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities* (HRA Protocol) provides a useful and detailed compendium of existing and modified guidance for conducting human health risk assessments for hazardous waste combustion facilities.

As a general comment, it would be helpful if this protocol and the related EPA *Guidance on Collection of Emissions Data to Support Site-Specific Risk Assessments at Hazardous Waste Combustion Facilities* (EPA 530-D-98-002, August 1998) could address potential changes to trial burns, risk burns, and risk estimation activities that would allow performance testing required by the forthcoming Maximum Achievable Control Technology (MACT)¹ rule for hazardous waste combustors (HWCs) to be coordinated with the collection of data for use in risk assessments. In particular, these changes could relate to the potential effects of installing carbon adsorption emissions control systems for mercury and dioxin/furan emissions and systems for improved particulate emissions control. Specific comments that track with the numbering convention of the draft protocol follow.

p. 1-3, paragraph 2 [Introduction]. This paragraph notes that there may be some cases in which a risk assessment would not be required by the permitting agency. On the previous page (1-2) it is stated that technical standards may not fully address potentially significant risks; however, for certain HWCs (primarily smaller facilities) the forthcoming MACT standards may result in substantially lower emissions limits for mercury, low-volatile metals, semi-volatile metals, dioxin/furan toxicity equivalents, and organic compounds. These may in fact be substantially lower than the HRA risk-based limits determined in an existing (i.e., previously accepted) health risk assessment (e.g., one already conducted for other compliance purposes). In such cases, it would be helpful if EPA would consider allowing such facilities to forego calculating completely new risk values for the same scenarios as used in the previous assessment if the facility has installed emissions reduction equipment or uses other methods that reduce emissions of significant contributors to risk where this reduction is demonstrated by test burn data. It would be useful if this flexibility could be explicitly incorporated into the guidance, including noting when such an approach or other simplified approaches would be acceptable, to reduce unnecessary duplication of effort.

p. 2-3 [Section 2.2.1, Estimating Stack Emissions Rates for Existing Facilities]. Section 2.2.1 of the HRA Protocol states two options for emissions rates:

“...emissions rates used to complete the risk assessment will be (1) long-term average emission rates adjusted for upsets, or (2) reasonable maximum emission rates measured during trial burn conditions in order to assure that risk assessments are conservative. Long-term average emission rates are based on

¹ See for example 61 *Federal Register (FR)*, p. 17358, April 19, 1996, *Hazardous Waste Combustors; Revised Standards; Proposed Rule 62*; also 62 *FR*, p. 24212, May 2, 1997, *Revised Technical Standards for Hazardous Waste Combustion Facilities; Proposed Rule \$ Notice of Data Availability and Request for Comments*; and 63 *FR* p. 33782, *Hazardous Waste Combustors; Revised Standards [Partial] Final Rule*.

tests of the combustion unit burning worst-case wastes at operating conditions that are representative of normal operating conditions over a long-term period.” and “Maximum emissions rates measured during trial burn conditions represent reasonable maximum emission rates.”

It may be helpful to further clarify that upset condition multiplication factors are not required to be used in risk burns that are based on maximum reasonable emissions rates (e.g., during trial burn destruction and removal efficiency [DRE] testing) rather than on “normal” operation conditions.

p. 2-8 [Section 2.2.1.3, Estimates of the Total Organic Emission (TOE) Rate]. The TOE is to be used in conjunction with the identified organic compounds and tentatively identified organic compounds (TICs) to calculate a TOE factor which can then be used to facilitate evaluation of potential risks from the unidentified fraction of organic compounds in the stack gas. This method may assume that the mass of unidentified organic compounds are associated with the same potential risk as an equal mass containing the measured distribution of identified and tentatively identified compounds. However, the scientific basis for this approach is not clear. It is suggested that EPA more explicitly consider allowing alternative simplified relative toxicity testing of the total organic emissions versus a “standard” emissions using one or more testing protocols. The standard emissions would contain only the identified and tentatively identified constituents in a distribution that simulates the measured distribution. This could allow better approximation of the relative toxicity of the unidentified fraction of organic compounds.

p. 2-10, last paragraph [Section 2.2.1.3, Estimates of the Total Organic Emission (TOE) Rate]. If compounds of potential concern are not detected, this section states that they should still be included in the TOE at the “reliable detection limit” (RDL) for non-isotope dilution methods or the estimated detection limit (EDL) for isotope dilution methods. The basis for using the full RDL and EDL as the concentrations of interest is readily apparent. (DOE notes that there have been past proposals to use one-half the detection limit or zero for this purpose; this would be consistent with EPA guidance for other widely implemented risk applications, including the *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part A), Office of Emergency and Remedial Response (OERR) 9200 6-303-894, December 1989*). In addition, other definitions of “detection limit” are currently in use (see for example Section 2.4.1). Therefore it would be helpful if the guidance could explain the basis for using the RDL and EDL or if flexibility were provided to apply more reasonable assumptions. Finally, the EDL to be used is not clearly defined in the guidance. Would it be acceptable to use either the SW-846 EDL or the laboratory EDL?

p. 2-11, middle paragraph [Section 2.2.1.3, Estimates of the Total Organic Emission (TOE) Rate]. As noted in this section, the gravimetric fraction remains problematic. The inorganic and organic artifacts that may not be eliminated by the recommendations for minimizing gravimetric fraction sampling errors in EPA’s *Guidance on Collection of Emissions Data to Support Site-Specific Risk Assessments at Hazardous Waste Combustion Facilities* (EPA 530-D-98-002, August 1998). DOE suggests that additional studies may help resolve certain issues involved in sampling, analysis of the gravimetric fraction, and the use of measured data to further minimize the effects of artifacts.

pp. 2-14 and 2-15 [Section 2.2.5, Emissions From Process Upsets]. The California Air Resources Board (CARB) default values for emissions increases related to upset conditions appear to be overly conservative. For example, preliminary values for one DOE mixed waste incinerator indicate that upsets occurred only 0.15% of the time. Of concern is whether the CARB factors are substantiated, whether they would apply to metals emissions (which are generally unaffected by changes in DRE due to upsets, particularly for facilities that control metal emissions by mechanical filtration that is unaffected by automatic waste feed cut-offs [AWFCOs]), and whether they are valid for facilities that use carbon adsorption to remove trace organics and mercury from the stack gas. It would be helpful if the process upset guidance included considerations for such systems, and also if the term “upset” could be defined (given that automatic waste feed cutoffs are sometimes used to define upsets).

p. 2-28, last paragraph [Section 2.2.71, Quantitative Estimation of RCRA Fugitive Ash Emissions]. A particle emission factor of 1.07 lb. per ton fly ash may not be appropriate for enclosed systems that use negative air pressure differentials and high-efficiency particulate air (HEPA)-filtered ventilation systems to control fugitive emissions. Examples of such systems are the ash-handling systems in facilities that combust radioactive hazardous waste.

p. 2-33, last paragraph [Section 2.3, Identifying Compounds of Potential Concern]. This paragraph states that “Since toxicity benchmarks and slope factors may change as additional toxicity research is conducted, permitting authorities should consult with the most current version of EPA’s Integrated Risk Information System (IRIS) and the *Health Effects Assessment Summary Tables* before completing a risk assessment to ensure that the toxicity data used in the risk assessment is based upon the most current Agency consensus.” DOE agrees with this statement and believe additional guidance would be helpful regarding the use of preliminary toxicity data (data that has not undergone full peer review and obtained consensus approval, and is therefore not incorporated into IRIS or the *Health Effects Assessment Summary Tables* [HEAST]) in the uncertainty portion of the HRA. For example, would coordination with EPA’s Environmental Criteria and Assessment Office be suggested?

p. 2-35, Figure 2-3. When no toxicological data are available for Compounds of Potential Concern (COPCs), the figure states “Evaluate qualitatively in the risk assessment using surrogate toxicity data from a similar compound.” If available, additional guidance would be helpful regarding how to select specific surrogate toxicity data and what defines “similar” compounds for this purpose. For example, if surrogate toxicity data were acceptable for a compound for which there are no data in IRIS or HEAST, then would preliminary toxicity data (not in IRIS or HEAST and not accepted on a consensus peer review basis) on that compound also be acceptable? Is guidance available regarding what general bases surrogate data and non-consensus toxicity data should be judged acceptable? Or for example would such data be judged acceptable only when specific EPA guidance addresses the compounds in question, such as for polychlorinated biphenyls (PCBs)? (See Section 2.3.3.1, Carcinogenic Risks.)

p. 2-37, Step 3. With regard to the condition for components of combustion unit feed streams, it is not clear how to establish whether a product of incomplete combustion (PIC) compound is or is not a component of such a stream, because waste streams are not analyzed for those types of compounds and feed limits are usually only established on precursors like chlorine or metals.

p. 2-58 (bottom) to p. 2-59. The section on chromium valence is somewhat confusing. For example, the statement is made that risk should initially be estimated assuming that 100% of the chromium emissions are hexavalent, but if an unacceptable risk is obtained with this hexavalent assumption the risk may be recalculated using the trivalent assumption for the indirect pathways. The risk estimates based on the trivalent assumption are then to be addressed in the uncertainty section. It might be helpful if this approach were presented in the context of a screening calculation, with additional site-specific (or literature) data used to inform the speciation assumption. There is also mention of possible consideration of chromium speciation at the points of potential exposure. It would be helpful if additional guidance could be provided to further explain this risk estimation process, including examples of more realistic calculations of the chromium speciation at the points of potential exposure.

pp. 2-60 through p. 2-68. The modeling methods and partitioning discussions for mercury are somewhat confusing. A brief summary might help clarify what is being modeled in the risk assessment. For example, from Figure 2-4 it appears that the total mercury emission rate is multiplied by 0.8 to get Hg^{+2} and by 0.2 to get Hg^0 when not considering the global cycle, and then the two are modeled separately. Alternately, when considering the global cycle the factors are 0.48 and 0.002, with the remainder not further addressed. (Is this correct?)

p. 2-72, second paragraph. Recommending that individual permitting authorities decide whether to evaluate criteria pollutants may not provide sufficient guidance in certain cases. It would be helpful if further guidance could be provided for those cases where criteria pollutants should be evaluated in the HRA, given that they may have already been otherwise addressed (given that these pollutants are also evaluated for air permitting and requirements related to the prevention of significant deterioration [PSD]). This could help reduce unnecessary duplication of effort.

p. 2-74 to 2-75 [Section 2.3.13, Radionuclides]. The section recommends using the ISCST3 air dispersion model in combination with the EPA slope factor methodology to estimate potential cancer risks from exposures to radionuclides. (Note the last sentence in the first paragraph: Radionuclide slope factors are used to estimate risk, not dose.) Although some of the limitations identified for the slope factor methodology can be mitigated using the dosimetry models incorporated into other EPA-accepted computer codes, such as CAP-88, GENII, or MEPAS (with conversion of the estimated doses to risks using accepted conversion factors), it is recognized that these dosimetry models also have limitations. (These include some similar to those identified for the slope factor approach as well as limitations associated with a number of other inherent assumptions, such as “reference man” body weight and age and non-consideration of competing risk factors.) In any case, the calculations required for meeting the National Emissions Standards for Hazardous Air Pollutants (NESHAPs) for radionuclide annual dose limitations are based on dose (i.e., 10 mrem/yr) rather than risk estimates.

Using these dose methodologies for combustion facilities could require some modifications, including adding one or more pathways not traditionally included for the NESHAPs estimates. Given that the radionuclide dose calculations are currently being accepted by regional EPA and state regulators for the NESHAPs process, it would be helpful if flexibility could be added to this protocol to also allow risk to be estimated using accepted dose-to-risk conversion factors. This would reduce the unnecessary duplication of effort and would help improve consistency between the two EPA-required assessments, i.e., the NESHAPs radiological dose

assessment and the HRA for mixed waste combustors (both of which are made available for public review). While the slope factor approach would result in more realistic risk estimates, using dose-to-risk conversion factors will provide comparable results within the error bounds of the overall assessment.

Additional clarifying comments: In the second sentence of the second paragraph of this section, it could be noted that air submersion is a significant exposure pathway only for certain radionuclides that emit high-energy beta particles, such as krypton-85. In the first sentence of pg. 75, it may be helpful to clarify that Federal Guidance Report #11 provides dose conversion factors for internal pathways (ingestion and inhalation). External dose conversion factors are given in Federal Guidance Report #12.

p. 6-2, Equation 6-1. It would be helpful to note that the denominator in this equation [BW x AT] does not apply for radionuclides.

pp. 2-76 to 2-85 [Section 2.4, Estimates of COPC Concentrations for Non-Detects, and Section 2.5, Concentrations Detected in Blanks]. These two sections contain some confusing language that could be misinterpreted if not further clarified. (For example, see Section 2.4 regarding the recommended use of the RDL for non-detected CPOCs.) A number of specific illustrations are noted in the following comments.

pp. 2-76 to 2-79 [Section 2.4.1, Definitions of Commonly Reported Detection Limits]. The second bullet states that Method Detection Limits (MDLs) are determined on analytical reagents (e.g., water) and not on the matrix of concern. For context, under the definition of MDL in EPA's Test Methods for Evaluating Wastes (SW-846, third edition, Chapter 1), it is stated that "when it is necessary to determine the MDL in the matrix, it should be determined on the basis of a minimum of three analyses of a matrix spike ... at a concentration three to five times the estimated MDL." The second bullet also notes that the current definition of MDL derives from the Clean Water Act, and hence the use of a water matrix. There are two points of potential confusion with this text that further clarification may mitigate. First, in this instance water would be considered a matrix, not an analytical reagent as may be suggested. Second, because the methods under this statute address primarily water, they would not appear to provide a universal foundation for the analysis of other media.

In the third bullet, the statement that the Reliable Detection Level (RDL) is a total of 8 standard deviations above the MDL developmental test data does not appear to be accurate. More precisely, the RDL is 8 times the standard deviation of the test data.

In the fourth bullet, the term A_s does not appear to be defined in Equation 2-4.

In the ninth (second-to-last) bullet, it may be helpful to modify the statement that the sample quantitation limit (SQL) varies with analyte concentration, to clarify that this limit varies with sample size and dilution. The statement that an SQL is generally 5 to 10 times the MDL could also be misleading or could be taken to imply that the MDL has little meaning. If an MDL were determined in an actual sample matrix, then the SQL would generally be similar to the MDL unless dilutions to reduce sample interference or high analyte concentrations were required. In those cases, but not in general, the SQL could be 5 to 10 times the MDL.

In the tenth (last) bullet, the characterization of the terms "Contract Required Quantitation

Limit/Contract Required Detection Limit (CRQL/CRDL) may be confusing. It might be helpful to further explain that these are quantitation levels that must, under contract, be achieved by analysis methods in order to meet study objectives. They can typically be achieved using a number of EPA-developed methods.

pp. 2-80 to 2-81 [Sec 2.4.2, Use in the Risk Assessment of Data Reported as Non-Detect]. The last paragraph of this section is somewhat confusing with regard to the recommended use of the RDL (as defined) for the concentration of non-detected COPCs in the risk assessment. In advocating the use of the MDL-derived RDL, rather than the lower (by a factor of 2.6) MDL, it is suggested that the former addresses the false positive issue. However, the context of such use is in evaluating non-detect data (negative results), so the possibility of a false positive is unclear. This would lead one to consider false positives a non-issue in this case. The MDL adequately controls the false negative rate (to less than 1%), which would appear to be the central concern when evaluating non-detects.

pp. 2-81 to 2-82 [Section 2.4.4, U.S. EPA OSW-Recommendations on Quantifying Non-Detects]. In the first paragraph, the recommended use of the MDL-derived RDL may not necessarily be “reasonable” or “scientifically sound.” It would be helpful if the basis for this use were further explained.

pp. 2-82 to 2-83 [Section 2.4.5, Estimated Maximum Possible Concentration]. Regarding the use of the estimated maximum possible concentration (EMPC) for dioxins and other contaminants analyzed by isotope-dilution GC/MS, it might be helpful to note that the use of alternative quantitation ions should be permitted if the signal-to-noise ratio of the ion signal is at least 2.5 and if tune data indicate that the mass spectrometer is operating within specifications. Such actions to reduce the EMPC would be far more cost effective than the suggested additional sample cleanup and/or reanalysis.

pp. 2-83 to 2-85 [Section 2.5, Concentrations Detected in Blanks]. (Minor editorial note:) The term “laboratory reagent of method blank” used in several places should be “laboratory reagent or method blank” or simply “method blank.” EPA’s SW-846 defines a reagent blank as the same as a method blank.

Trip Blank: The suggestion that because trip blanks are not opened until they are analyzed makes the laboratory “blind” to the identity of the blanks is not necessarily so. Trip blanks are typically clearly labeled as such. Moreover, the purpose of analyzing them blind is not directly obvious.

Field Blank: The stated purpose of a field blank is to “determine if field sampling or cleaning procedures result in cross contamination of site samples” but this may not be fully accurate. That function is served with rinsate samples, while field blanks serve the very limited purpose of determining if any contamination is introduced to the sample or sample container (presumably from the air) during the process of opening the sample container and introducing the sample. The usefulness of field blanks appears to be limited to water samples. As with trip blanks, it is not necessary to analyze them blind (see above).

Instrument Blank: The description of an instrument blank as “distilled, deionized water injected directly into an instrument” may not be fully correct. For example, it is not expected that water would be injected into a gas chromatograph (GC) or a GC/Mass Spectrometer, as

this could potentially harm the instrument or column. Rather, a solvent (or nothing, via an empty syringe) would more likely be injected into such instruments.

Second paragraph: This short paragraph addresses the application of blank data to samples; the text may be somewhat confusing. The case addressed is one where the association between blanks and data cannot be made (presumably, this would occur where one doesn't know which blank goes with which batch of samples). The suggested practice of comparing all blanks to all samples may not be conservative and could potentially result in rejecting actual "detects."

Third and fourth paragraphs: The discussion on common laboratory contaminants is somewhat confusing and would be improved if further clarification were provided.

p. 3-20 ff [Section 3.4.2, Particle Phase Modeling (Mass Weighting), and Section 3.4.3, Particle-Bound Modeling (Surface Area Weighting)]. The limited amount of particulate material (PM) that can be collected in a reasonable sampling time, the narrow range of particle sizes, and the effects on particle composition/density from variable feeds are problematic for HEPA-filtered systems that have highly variable waste feed. It would be helpful if acceptable approaches for measuring particle size distribution and particle density for such systems could be given here or in the related EPA document, *Collection of Emissions Data to Support Site-Specific Risk Assessments at Hazardous Waste Combustion Facilities* (EPA-530-D-98-002, 1998). The current approach may appear to define an inordinate amount of detailed calculation for COPCs adsorbed on particulate fractions when a substantial (and possibly overriding error) can be introduced by a lack of realistic PM size and density data. One alternative would be to assume a default particle size distribution for uncontrolled emissions at a generic incinerator (available in CARB reports, EPA's AP-42, and the scientific literature), then make modifications via spreadsheets based on the penetration fraction through the specific air pollution control devices (APCDs) at the given facility. It could be helpful to include an example of this type of spreadsheet calculation in the guidance.

p. 4-19 [Section 4.2.5, Subsistence Fisher, and Section 4.2.6, Subsistence Fisher Child]. It would be helpful if additional information regarding when the subsistence fisher and subsistence fisher child scenarios should be evaluated, what documentation should be relied on for the presence of subsistence fishers, and how the results must be assessed. (Similarly, acknowledgement of the importance of including other scenarios as indicated – e.g., those unique to Native Americans – may help ensure comprehensiveness.)

p. 4-21 [Section 4.2.7, Acute Risk Scenario]. DOE agrees with the statement that "Workers from the facility under direct evaluation in the risk assessment are excluded in most cases, because there are other guidance and regulations for occupational exposures to hazardous waste and hazardous waste combustion emissions within the facility boundary (e.g., OSHA)." However the statement might still imply that a requirement could exist to directly evaluate workers in the HRA in some undefined cases. It would be helpful to define these cases or explicitly exclude workers covered by other guidance and regulations.

p. 4-24, last paragraph [Section 4.3, Selection of Exposure Scenario Locations]. It is stated in the discussion that "The recommended ISCST3 modeled receptor grid node array extends out about 10 km from facility emissions sources (see Chapter 3)." It would be helpful if it were further clarified that for facilities on large controlled sites, such as a DOE site that may be as

large as 800 km², it would be appropriate to further extend the limit of the ISCST3 modeled receptor grid node array to reflect the fact that areas that could be assumed to be residential may be more distant.